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DRAFT TRANSLATION

ON THE INFLUENCE OF THE SUPERCORONA ON RADIO EMISSION FROM THE SUN

(O vliyanii sverkhkorony na prinimayemoye radioizlucheniye Solntsa)

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ABSTRACT

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Calculations are made of the influence of the supercorona on radio emission from separate regions of the Sun for a radial model of inhomogemeities. The finite distances between the source of radio emission and the scattering regions of the supercorona are taken into account. The scattering angles are calculated for functions of the types $\Psi(x) = \Psi_0 x^{-n}$ and $\Psi^2(x) = \Psi_1^2 x^{-n_1} + \Psi_2^2 x^{-n_2}$.

Expressions are obtained for the coefficients of scattering attenuation due to the finite distances from the source to the scattering regions. The finite distances from the source of radio emission to the scattering regions of the supercorona also leads to a decrease by 3 — 10^2 of the scattering effect for various positions of the sources. Apparent angle dimensions of active regions of the Sun for 3.5 m, 5.8 m and 12 m waves are compiled in Table 2. Observation of these regions makes it possible to obtain new data on the structure of electron inhomogeneities in the supercorona.

Author

COVER-TO-COVER TRANSLATION

It is now well known that electron inhomogeneities of the supercorona surrounding the Sun, and presently observable at distances from 4.5 $R_\odot$ to 30 $R_\odot$ ($R_\odot$ being the optical radius of the Sun),

scatter radiowaves received from a discreet source of radio emission during the period of its concealing by the supercorona in the middle of the month of June of every year [1 - 4]. As this was lately established [5-7], these inhomogeneities have an elongated shape, and they create an anisotropic scattering. The exact configuration of these inhomogeneities is still unknown. Neither is it clear whether or not this configuration remains invariable. However, it may be considered in the first and very rough approximation that they are radial in relation to the Sun [7, 8]. In any case, this has bearing on the "left" part of the supercorona, which is observable during the first phase of covering.

Attention was drawn still earlier to the fact, that the inhomogeneities of the Sun's supercorona, situated in the path of radiowave propagation, scatter the radiowaves emitted by the Sun [9]. As a consequence, the received Sun's radio emission is distinct from that eventually observed in the absence of the supercorona. The presence of supercorona leads to a visible increase in the angular dimensions of active regions of radio emission, and also to the increase of the effective diameter of quiet Sun's radio emission. It was also noted, that the duration of separate brief radiobursts will increase at the expense of the indicated effects.

However, all the effected computations were beset with two shortcomings. First of all, the circumstance that the distance between the active regions of radio emission and the Sun's supercorona creating the scattering, is finite, was not accounted for, while this accounting leads to a notable decrease of all the registered effects.

Secondly, computations originated from the representation of an isotropic model of inhomogeneities, since no information on their elongation and their approximate radiality was available at that time. The accounting of this leads, as was already noted [10], to a notable increase of all effects.

This paper presents the computations of the influence of the supercorona on the Sun's radio self-emission for a radial model of inhomogeneities, account being taken of the finiteness of the distance from the radio emission source to the scattering regions of the supercorona.

I. INITIAL CORRELATIONS

Let us designate as previously by $\Psi(x)$ the inhomogeneity scattering function, these inhomogeneities being considered as radial. It is admitted that $\Psi(x)$ depends only on the distance from the center of the Sun, and is not dependent upon the angular coordinates of the site of the inhomogeneity on the Sun.

In this case the expression of the scattering angle Φ for a source at infinity, at a minimum distance of the ray from the Sun designated by r_1 will be written in the following manner, as is well known [10]:

$$\Phi^2(r_1) = 2\int_{r_1}^{\infty} \Psi^2(x)\,\frac{x\,dx}{\cos\alpha\sqrt{x^2-r_1^2}} = \frac{2}{r_1}\int_{r_1}^{\infty} \Psi^2(x)\,\frac{x^2dx}{\sqrt{x^2-r_1^2}}. \qquad (1)$$

Here α designates the angle between the normal drawn from the center of the Sun to the line of the beam, and to the straight line, linking the current coordinate with the center of the Sun.

Let us compute the effect of scattering for the source situated in the supercorona, in the visual beam at point A_2 (Fig. 1). If the wave is flat, i. e. if the finiteness of the distance from the source to supercorona's inhomogeneities is not taken into account, we shall have the following exoression of the angle of scattering for a radial model of inhomogeneities :

$$\Phi_{2\Pi}^2(r_1, r_2) = \frac{1}{r_1}\int_{r_2}^{\infty} \Psi^2(x)\,\frac{x^2dx}{\sqrt{x^2-r_1^2}} \qquad (2)$$

(index Π meaning the the examined wave is a flat wave). If the source

is situated to the left of point A_1, and namely at the point A_3 at the distance r_2 (Fig. 1), we have

$$\Phi_{3\pi}^2(r_1, r_2) = \frac{2}{r_1}\int_{r_1}^{r_2} \Psi^2(x)\frac{x^2dx}{\sqrt{x^2-r_1^2}} + \frac{1}{r_1}\int_{r_2}^{\infty} \Psi^2(x)\frac{x^2dx}{\sqrt{x^2-r_1^2}} \tag{3}$$

or

$$\Phi_{3\pi}^2(r_1, r_2) = \frac{2}{r_1}\int_{r_1}^{r_2} \Psi^2(x)\frac{x^2dx}{\sqrt{x^2-r_1^2}} + \Phi_{2\pi}^2(r_1, r_2). \tag{4}$$

Obviously, at $r_2 \to \infty$ $\Phi_{2\pi}^2(r_1, r_2)$ tends toward zero and $\Phi_{3\pi}^2(r_1, r_2)$ passes into $2\,\Phi_{\pi}^2(r_1)$, which naturally is as it should be.

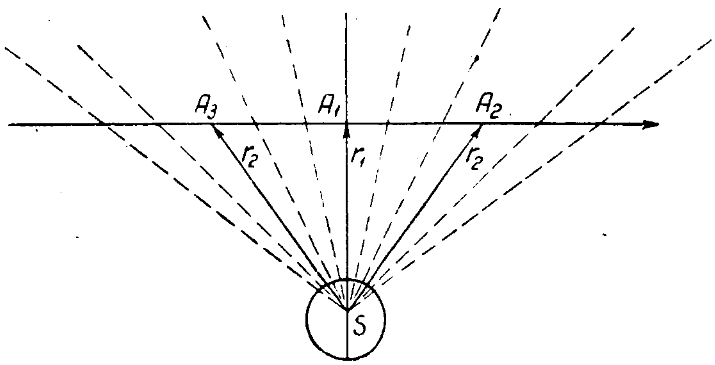

Fig. 1

Let us now take into account the finiteness of the distance between the source and the inhomogeneities of the supercorona. If Φ is the scattering angle from a source situated at a finite distance R_1 from a screen and observed at a distance R_2 from the scattering screen, and Φ_π is the scattering angle at $R_1 \to \infty$ from the same screen, there is between Φ and Φ_π a correlation accounting the smallness of the angles :

$$\frac{\Phi}{\Phi_\pi} = \frac{R_1}{R_1+R_2} \tag{5}$$

or

$$\Phi^2 = \Phi_\pi^2\left(\frac{R_1}{R_1+R_2}\right)^2. \tag{6}$$

If the scattering layer has a finite, and not too great a thickness (so that the condition $R_1 \ll R_2$ is fulfilled for any cros-section, condition which is valid for all regions of the supercorona), we obtain, by taking advantage of the formula for the scattering angle of a flat wave

$$\Phi_{\text{п}}^2 = \int_{x_1}^{x_2} \Psi^2(x)\,dx,$$

the expression for a scattering angle of a spherical wave in the form:

$$\Phi^2 = \int_{x_1}^{x_2} \Psi^2(x)\,\frac{R_1^2(x)}{R_0^2}\,dx, \tag{7}$$

where R_o is the distance between the source of radio emission and the receiver ; $\Psi(x)$ is the scattering function, different from zero within the limits of the scattering layer, i.e. in the interval of distances from x_1 to x_2 from the source in the direction of the receiver. The expression

$$\Psi_c(x) = \Psi(x)\,\frac{R_1(x)}{R_0},$$

standing under the integral, plays the part of the scattering function in the case of a spherical wave.

2. SCATTERING FUNCTION OF A SPHERICAL WAVE

If we describe the scattering angle Φ_{π} for a flat wave by the exponential function $\Phi_{\pi} = k/r^m$, the scattering function $\Psi(x)$ will have, as was shown in [10], the form :

$$\Psi^2(x) = \frac{k^2(2m-1)}{2\sqrt{\pi}}\;\frac{\Gamma(m)}{\Gamma(m+1/2)}\;\frac{1}{x^{2m+1}}.$$

Taking into account the multiplier linked with the finiteness of the distance from the source to the scattering medium, we shall obtain for the scattering function of a spherical wave the following expression :

$$\Psi_c^2(x) = \frac{k_1^2(2m-1)}{2\sqrt{\pi}} \frac{\Gamma(m)}{\Gamma(m+1/2)} \frac{1}{x^{2m-1}}.$$

If $r_1 = r_2$, we have

$$k_1^2 = \frac{k^2}{R_0^2 - r_1^2}\left(1 - \frac{r_1^2}{x^2}\right).$$

The dependences Ψ_c^2 from the distance **x** for different values of the parameter **m** are plotted in Fig. 2, where all the curves are reduced to the same scale. This diagram shows that the greater values of parameter m correspond to the fast decrease with the distance of the scattering function. This means, that the regions lying near the source, and containing the inhomogeneities exert the most effective influence on the scattering. The smaller the value of the parameter m, the greater is the contribution by the regions remote from the source.

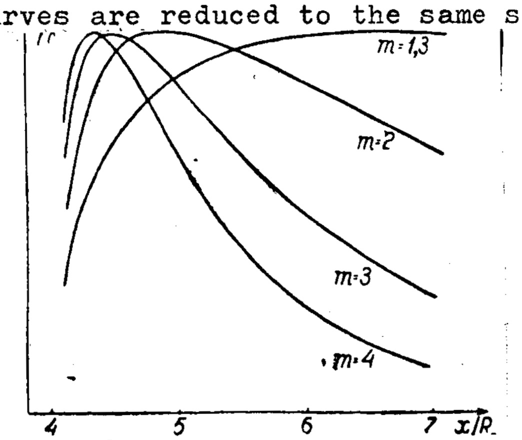

Fig. 2. The square of the scattering function of the spherical wave as a function of the distance for various values of parameter m .

It is obvious that in case of a radial model of inhomogeneities, the following expressions for the angles of scattering correspond to the positions A_2 and A_3 of the source (Fig. 1) :

$$\Phi_2^2(r_1, r_2) = \frac{1}{r_1}\int_{r_2}^{\infty} \Psi^2(x)\frac{x^2dx}{\sqrt{x^2-r_1^2}}\left[\frac{x^2}{A} - \frac{2\sqrt{x^2-r_1^2}}{A}\times\right.$$
$$\left.\times\sqrt{r_2^2-r_1^2} + \frac{r_2^2-2r_1^2}{A}\right]; \tag{8}$$

$$\Phi_3^2(r_1, r_2) = \frac{1}{r_1}\int_{r_1}^{\infty} \Psi^2(x)\frac{x^2\,dx}{\sqrt{x^2-r_1^2}}\left[\frac{x^2}{A} + \frac{2\sqrt{x^2-r_1^2}}{A}\times\right.$$
$$\left.\times\sqrt{r_2^2-r_1^2} + \frac{r_2^2-2r_1^2}{A}\right] + \frac{1}{r_1}\int_{r_2}^{r_1}\Psi^2(x)\frac{x^2\,dx}{\sqrt{x^2-r_1^2}}\times \tag{9}$$
$$\times\left[\frac{x^2}{A} - \frac{2\sqrt{x^2-r_1^2}}{A}\sqrt{r_2^2-r_1^2} + \frac{r_2^2-2r_1^2}{A}\right],$$

where
$$A = R_0^2 + 2\sqrt{R_0^2-r_1^2}\,\sqrt{r_2^2-r_1^2} + r_2^2 - 2r_1^2.$$

These expressions are inapplicable for the case when $r_1 = 0$, i. e. for the case when the position of the source is projected on the center of the Sun. At the same time, the direction of the ray and that of the elongation coincide, and the resulting expressions for the angles of scattering lose all sense.

In the particular case when $r_1 = r_2$, i. e. when the source is situated in the equatorial plane of the Sun, formulas (8) and (9) are significantly simplified, and take the following form :

$$\Phi_2^2(r_1, r_2) = \Phi_3^2(r_1, r_2) = \frac{1}{r_1(R_0^2-r_1^2)}\int_{r_1}^{\infty}\Psi^2(x)\frac{x^2\,dx}{\sqrt{x^2-r_1^2}}(x^2-r_1^2). \tag{10}$$

For a series of further computations and estimates, magnitudes η_2 and η_3 may be introduced. They are the attenuation factors of the scattering effect on account of the finiteness of the distance from the source to the scattering layer, which we shall determine as follows :

$$\eta_2^2(r_1, r_2) = \frac{\Phi_2^2(r_1, r_2)}{\Phi_{2n}^2(r_1, r_2)}; \qquad \eta_3^2(r_1, r_2) = \frac{\Phi_3^2(r_1, r_2)}{\Phi_{3n}^2(r_1, r_2)}.$$

It is evident that they have the form

$$\eta_2^2(r_1, r_2) = A^{-1}\Big[\int\limits_{r_2}^{\infty} \Psi^2(x)\frac{x^4\,dx}{\sqrt{x^2 - r_1^2}} - 2\sqrt{r_2^2 - r_1^2}\int\limits_{r_2}^{\infty}\Psi^2(x)\,x^2dx +$$

$$+ (r_2^2 - 2r_1^2)\int\limits_{r_2}^{\infty}\Psi^2(x)\frac{x^2\,dx}{\sqrt{x^2 - r_1^2}}\Big]\Big[\int\limits_{r_2}^{\infty}\Psi^2(x)\frac{x^2\,dx}{\sqrt{x^2 - r_1^2}}\Big]^{-1};$$

$$\eta_3^2(r_1, r_2) = A^{-1}\Big[\int\limits_{r_1}^{\infty}\Psi^2\frac{x^4\,dx}{\sqrt{x^2 - r_1^2}} + 2\sqrt{r_2^2 - r_1^2}\int\limits_{r_1}^{\infty}\Psi^2 x^2dx +$$

$$+ (r_2^2 - 2r_1^2)\int\limits_{r_1}^{\infty}\Psi^2\frac{x^2\,dx}{\sqrt{x^2 - r_1^2}} + \int\limits_{r_2}^{r_1}\Psi^2\frac{x^4\,dx}{\sqrt{x^2 - r_1^2}} -$$

$$- 2\sqrt{r_2^2 - r_1^2}\int\limits_{r_2}^{r_1}\Psi^2 x^2\,dx + (r_2^2 - 2r_1^2)\int\limits_{r_2}^{r_1}\Psi^2\frac{x^2\,dx}{\sqrt{x^2 - r_1^2}}\Big]\times$$

$$\times\Big[\int\limits_{r_1}^{\infty}\Psi^2(x)\frac{x^2\,dx}{\sqrt{x^2 - r_1^2}} + \int\limits_{r_2}^{r_1}\Psi^2(x)\frac{x^2\,dx}{\sqrt{x^2 - r_1^2}}\Big]^{-1}.$$

We have conducted computations of integrals for the scattering function of a flat wave, given by an exponential function in the form:

$$\Psi(x) = \frac{\Psi_0}{x^n}, \quad n > 0.$$

Let us note, that parameters m and n are linked by the correlation $m = n - 1/2$. That is why it is interesting to examine the cases when $n > 2$. The results of calculations give the following expressions for the angles of scattering:

$$\Phi^2(r_1) = -\frac{\Psi_0^2}{r_1^{2n-3}(R_0^2 - r_1^2)}\frac{\sqrt{\pi}}{2}\left[\frac{\Gamma(n-2)}{\Gamma(n-3/2)} - \frac{\Gamma(n-1)}{\Gamma(n-1/2)}\right]$$

where the gamma-function is designated by $\Gamma(n)$,

$$\Phi_2^2(r_1, r_2) = \frac{\Psi_0^2}{r_1 A}\left\{\left[-\frac{1}{r_1^{2n-4}} - \frac{(r_2^2 - 2r_1^2)}{r_1^{2n-2}}\frac{(2n-4)}{(2n-3)}\right]\int\limits_{\arccos(r_1/r_2)}^{\pi/2}\cos^{2n-5}\varphi\, d\varphi - \right.$$
$$\left. - \frac{2\sqrt{r_2^2 - r_1^2}}{(2n-3)r_2^{2n-3}} + \frac{(r_2^2 - 2r_1^2)\sqrt{r_2^2 - r_1^2}}{(2n-3)\, r_1^2 r_2^{2n-3}}\right\};$$

$$\Phi_3^2(r_1, r_2) = \frac{\Psi_0^2}{r_1 A}\left\{-\frac{1}{r_1^{2n-4}}\frac{\sqrt{\pi}}{2}\frac{\Gamma(n-2)}{\Gamma(n-3)} - \frac{(r_2^2 - 2r_1^2)}{r_1^{2n-2}}\frac{\sqrt{\pi}}{2}\frac{\Gamma(n-1)}{\Gamma(n-1/2)} + \right.$$
$$+ \frac{4\sqrt{r_2^2 - r_1^2}}{(2n-3)\, r_1^{2n-3}} - \frac{2\sqrt{r_2^2 - r_1^2}}{(2n-3)\, r_2^{2n-3}} + \frac{(r_2^2 - 2r_1^2)\sqrt{r_2^2 - r_1^2}}{(2n-3)\, r_1^2 r_2^{2n-3}} -$$
$$\left. - \left[\frac{1}{r_1^{2n-4}} + \frac{(r_2^2 - 2r_1^2)}{r_1^{2n-2}}\frac{(2n-4)}{(2n-3)}\right]\int\limits_{\arccos(r_1/r_2)}^{0}\cos^{2n-5}\varphi\, d\varphi\right\}.$$

Correspondingly, the expressions for the attenuation factor of scattering will have the form :

$$\eta^2(r_1) = \frac{r_1^2}{R_0^2 - r_1^2}\left[\frac{\Gamma(n-2)\Gamma(n-1/2)}{\Gamma(n-1)\,\Gamma(n-3/2)} - 1\right];$$

$$\eta_2^2(r_1, r_2) = A^{-1}\left\{\left[r_1^2 + (r_2^2 - 2r_1^2)\frac{(2n-4)}{(2n-3)}\right]\int\limits_{\arccos(r_1/r_2)}^{\pi/2}\cos^{2n-5}\varphi\, d\varphi + \right.$$
$$\left. + \frac{2\sqrt{r_2^2 - r_1^2}\, r_1^{2n-2}}{(2n-3)\, r_2^{2n-3}} - \frac{(r_2^2 - 2r_1^2)\sqrt{r_2^2 - r_1^2}\, r_1^{2n-4}}{(2n-3)\, r_2^{2n-3}}\right\} \times$$
$$\times \left[-\frac{r_1^{2n-4}\sqrt{r_2^2 - r_1^2}}{(2n-3)\, r_2^{2n-3}} + \frac{(2n-4)}{(2n-3)}\int\limits_{\arccos(r_1/r_2)}^{\pi/2}\cos^{2n-5}\varphi\, d\varphi\right]^{-1}.$$

It is easy to effect similar calculations for a scattering function given in the form of an exponential polynome with exponents n_i :

$$\Psi(x) = \sum_{i=1}^{N} \frac{k_i}{x^{n_i}} .$$

In particular, for a scattering function of the form

$$\Psi^2(x) = \frac{\Psi_1^2}{x^{n_1}} + \frac{\Psi_2^2}{x^{n_2}}$$

we shall obtain

$$\Phi^2(r_1) = -\frac{\Psi_1^2}{r_1^{n_1-3}(R_0^2 - r_1^2)} \frac{\sqrt{\pi}}{2} \left[\frac{\Gamma(n_1/2-2)}{\Gamma(n_1/2-3/2)} - \frac{\Gamma(n_1/2-1)}{\Gamma(n_1/2-1/2)}\right] - \\ -\frac{\Psi_2^2}{r_1^{n_2-3}(R_0^2 - r_1^2)} \frac{\sqrt{\pi}}{2} \left[\frac{\Gamma(n_2/2-2)}{\Gamma(n_2/2-3/2)} - \frac{\Gamma(n_2/2-1)}{\Gamma(n_2/2-1/2)}\right];$$

$$\Phi_2^2(r_1, r_2) = \frac{\Psi_1^2}{r_1 A}\left\{\left[-\frac{1}{r_1^{n_1-4}} - \frac{(r_2^2 - 2r_1^2)}{r_1^{n_1-2}} \frac{(n_1-4)}{(n_1-3)}\right] \int\limits_{\arccos(r_1/r_2)}^{\pi/2} \cos^{n_1-5}\varphi\, d\varphi - \right. \\ \left. -\frac{2\sqrt{r_2^2 - r_1^2}}{(n_1-3)\, r_2^{n_1-3}} + \frac{(r_2^2 - 2r_1^2)\sqrt{r_2^2 - r_1^2}}{(n_1-3)\, r_1^2 r_2^{n_1-3}}\right\} + \\ + \frac{\Psi_2^2}{r_1 A}\left\{\left[-\frac{1}{r_1^{n_2-4}} - \frac{(r_2^2 - 2r_1^2)}{r_1^{n_2-2}} \frac{(n_2-4)}{(n_2-3)}\right] \int\limits_{\arccos(r_1/r_2)}^{\pi/2} \cos^{n_2-5}\varphi\, d\varphi - \right. \\ \left. -\frac{2\sqrt{r_2^2 - r_1^2}}{(n_2-3)\, r_2^{n_2-3}} + \frac{(r_2^2 - 2r_1^2)\sqrt{r_2^2 - r_1^2}}{(n_2-3)\, r_1^2 r_2^{n_2-3}}\right\}.$$

3. DEPENDENCE OF THE SCATTERING EFFECT UPON THE POSITION OF THE SOURCE ON THE SPHERE

In a radial model of inhomogeneities of the Sun's super-corona, the number of inhomogeneities traversed by the wave is dependent upon the position of the source on the sphere (r_2 = const.) Fig. 3. That is why there should exist for the same values r_2 an effect of dependence of spot dimensions from the angle φ.

Let us examine a source situated on a sphere $r_2 = \text{const}$ at a point (r_1', r_2) For that source

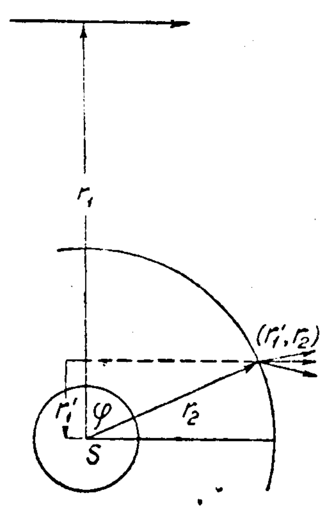

Fig. 3.

$$\Phi_2^2(r_1', r_2) = \gamma_{i2}^2(r_1', r_2)\,\Phi_{2N}^2(r_1', r_2)\,\frac{\Phi_n^2(r_2)}{\Phi_n^2(r_2)} =$$

$$= \gamma_{i2}^2(r_1', r_2)\left[\frac{\Phi_n^2(r_1') - \Delta\Phi_n^2\Big|_{r_1'}^{r_2}}{\Phi_n^2(r_2)}\right]\Phi_n^2(r_2).$$

If the scattering angle of a flat wave is given by the exponential function

$$\Phi_n(r) = \frac{k}{r^m},$$

the correlation

$$\frac{\Phi_n(r_1')}{\Phi_n(r_2)} = \left(\frac{r_2}{r_1'}\right)^m = \frac{1}{\cos^m\varphi}.$$

is fulfilled for the two positions of the source – r_1' and r_2. Then

$$\Phi_2^2(r_1', r_2) = \gamma_{i2}^2(r_1', r_2)\left[\frac{1}{\cos^{2m}\varphi} - \frac{\Delta\Phi_n^2\Big|_{r_1'}^{r_2}}{\Phi_n^2(r_2)}\right]\Phi_n^2(r_2),$$

where $\Delta\Phi_n^2\Big|_{r_1'}^{r_2}$ is the scattering of a flat wave in the interval $r_1' \div r_2$.

It may be seen from Fig. 2 that for the value $m = 1.3$, the effect of distance finiteness results in that the lower regions of the supercorona contribute little to the general scattering effect. For greater values m the basic effect on scattering stems from the supercorona regions, situated within the range from $4R_\odot$ to $6R_\odot$.

If during subsequent observations the prelinary result [10] is corroborated, i. e. that the values m in the regions of the supercorona to $20R_\odot$ differ little from the unity, this will mean that the lower layers of the supercorona exert little influence on the

scattering in the active regions of the Sun, namely those layers adjacent to the solar corona, and that the basic influence is exerted by regions from $5R_{\odot}$ and up. We may then obtain by measurements of angular dimensions of the active regions in the Sun, the characteristics of the very same regions of the supercorona that are obtained by the direct method of observations with the utilization of the crab nebula.

The conducting of such measurements may prove to be quite useful for the obtention of new characteristics of the supercorona, and in particular of data on structure of inhomogeneities.

Therefore, for small values of parameter **m**, when the scattering function does not have a sharp maximum (i. e. a substantial contribution to scattering is made by the regions remote from the source), the magnitude

$$\frac{\Delta\Phi_{\pi}^{2}\Big|_{r_1'}^{r_2}}{\Phi_{\pi}^{2}(r_2)}$$

is small by comparison with $\cos^{-2m}\varphi$ and may be neglected in the first approximation. Then

$$\Phi_2^2(r_1', r_2) \simeq \eta_2^2(r_1', r_2)\frac{1}{\cos^{2m}\varphi}\Phi_{\pi}^2(r_2) = \eta_2^2(r_1', r_2)\frac{1}{\cos^{2m}\varphi}\left(\frac{r_1}{r_2}\right)^{2m}\Phi_{\pi}^2(r_1).$$

Taking advantage of the value $\Phi_{\pi}^{2}(r_1)$, the known values $\eta_2^2(r_1', r_2)$ from the experiments of the crab nebula translucence by the solar corona and from theoretical computations, we may estimate the size of local sources, for exmaple — of spots, according to formula (11).

Let us estimate the angular dimensions of the source for great values φ, when $r_2 \gg r_1'$. In that case, the expression for the attenuation factor $\eta_2^2(r_1', r_2)$ will have the form

$$\eta_2^2(r_1', r_2) = \frac{r_2^2}{(R_0 + r_2)^2}\left[\frac{2\left(\frac{r_1'}{r_2}\right)^{2n-2}}{(2n-4)\int\limits_{\arccos(r_1'/r_2)}^{\pi/2}\cos^{2n-5}\varphi\, d\varphi} + 1\right].$$

The values $\eta_2^2(\varphi)$, computed for the parameter n = 3, are compiled in Table 1. As to the scattering angles of the point source Φ_2, they are compiled in Table 2.

TABLE 1

Values of the Scattering Attenuation Factor $\eta_2^2(r_1', r_2)$ for n = 3

φ (град)	$r_2/R_\odot$	$\eta_2^2(r_1', r_2)$
45	4	$1{,}599 \cdot 10^{-3}$
	6	$3{,}600 \cdot 10^{-3}$
50	4	$1{,}768 \cdot 10^{-3}$
	6	$3{,}977 \cdot 10^{-3}$
60	4	$2{,}400 \cdot 10^{-3}$
	6	$5{,}400 \cdot 10^{-3}$
70	4	$4{,}184 \cdot 10^{-3}$
	6	$1{,}109 \cdot 10^{-2}$
80	4	$1{,}406 \cdot 10^{-2}$
	6	$3{,}166 \cdot 10^{-2}$
85	4	$0{,}526 \cdot 10^{-1}$
	6	$1{,}183 \cdot 10^{-1}$
88	4	$3{,}257 \cdot 10^{-1}$
	6	$7{,}389 \cdot 10^{-1}$

Table 2 (next page) shows that the scattering effect may be quite substantial under specific conditions. However, the numeral results of Table 2 should only be taken as estimates, because of the absence of reliable experimental data.

It must be noted, that the indicated values are brought forth for an ideal model, when the inhomogeneities are fully radial. That is why, for angles φ near 90°, the part of the outermost regions of the supercorona becomes quite substantial. If we take

into account that in fact the inhomogeneities apparently are not entirely radial, and they have a mean quadratic value of deflection of about 10 to 25°, the part of the outer layers of the supercorona will be diminished. The estimates show that for the parameter <u>n</u> varying within the limits from 2 to 2.5, and for the deflections from the radial direction indicated in Table 2, the magnitudes of the scattering angles Φ_2 must be reduced 1.5 to more or less 2 times.

<u>Table 2</u>

Values of the scattering angles Φ_2 of a point source situated in the solar supercorona for various angles φ and for $r_1 = 6R_{\odot}$

λ(м)	Φ_{11} (угл мин)	φ (град)	$r_2/R_{\odot}$	Φ_2 (угл мин)
3,5	13	50	4	3
			6	2
		60	4	9
			6	5
		70	4	23
			6	14
		80	4	75
			6	41
5,8	37	50	4	9
			6	5
		60	4	28
			6	15
		70	4	68
			6	40
		80	4	215
			6	117
12	155,4	50	4	38
			6	21
		60	4	119
			6	64
		70	4	286
			6	169
		80	4	907
			6	493

***** THE END *****

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